

Notice of Allowability

Application No.

10/750,984

Applicant(s)

WAYCUILIS, JOHN J.

Examiner

Art Unit

Rosalynd Keys

1621

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☐ This communication is responsive to ____.
2. ☒ The allowed claim(s) is/are 1-33.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some* c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: ____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date ____.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date ____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date 5/24/04
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date ____.
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other ____.

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Rodney F. Brown on February 17, 2006.

The application has been amended as follows:

- a) delete the word "liquid" from the title.
- b) on page 4, line 15, delete the word "second" and replace it with the word "first".
- c) on page 24, line 14 (in claim 31), delete the word "second" and replace it with the word "first".

Information Disclosure Statement

2. The information disclosure statement (IDS) submitted on May 24, 2004 has been considered by the examiner.

Allowable Subject Matter

- 3. Claims 1-33 are allowed.
- 4. The following is an examiner's statement of reasons for allowance: claims 1-31 and claim 33 are allowable over the prior art because the prior art fails to teach or fairly suggest the claimed step wherein the first bromide salt is regenerated by passing bromine over a first fixed bed thereby reacting said bromine with the second bromide salt in said first fixed bed to produce said first bromide salt. U.S. Patent No. 5,334,777 (which is a C-I-P of U.S. Patent No.

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5,243,098) is the closest prior art to claim 32. Claim 32 is patentable over U.S. Patent No. 5,334,777 because in claim 32 the first bromide salt is generated by passing hydrobromic acid over a second fixed bed containing metal oxide in a solid state and also by passing alkyl bromide over said second fixed bed in the presence of water, whereas in U.S. Patent No. 5,334,777 the first bromide salt is generated by passing air and oxygen through a third bromide salt to recover hydrobromic acid, which is reacted with more oxygen and the second bromide salt to obtain the first bromide salt. In short, instant claim 32 generates the first bromide salt in fewer steps than required by U.S. Patent No. 5,334,777.

5. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

van Helden et al. (U.S. Patent No. 3,210,152) teaches regeneration of metal-containing reaction component by contacting it with oxygen-containing gas in the presence of a liquid mixture comprising a carboxylic acid and a mineral acid, as well as a promoter (see entire disclosure, in particular column 2, line 66 to column 5, line 39).

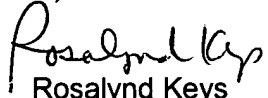
Sherman et al. (Pub. No. 2003/0069452 A1) teach synthesis of alcohols and ethers from alkanes by reaction of said alkane with a metal halide (see entire disclosure, in particular paragraphs 0012 to 0018).

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7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rosalynd Keys whose telephone number is 571-272-0639. The examiner can normally be reached on M-W & F 4-10pm; H 5:30am-5pm; Sat 8am-1pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Johann Richter can be reached on 571-272-0646. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Rosalynd Keys
Primary Examiner
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February 21, 2006

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the transition metal of the first and second bromide salts.

The alkyl bromide is likewise passed over the second fixed bed in the presence of the steam to produce the first bromide salt and an oxygenated product, which is preferably an alcohol or an ether. The first bromide salt produced above is retained in the second fixed bed in a solid state, while the oxygenated product is conveyed from the second fixed bed in a gas state. The oxygenated product may be condensed downstream of the second fixed bed and recovered as a desirable liquid product.

The metal oxide in the second fixed bed is regenerated by passing oxygen, preferably in air, over the second fixed bed. The oxygen reacts with the first bromide salt in the second fixed bed to produce the metal oxide in a solid state and bromine in a gas state. The metal oxide is retained in the second fixed bed, while the bromine is conveyed from the second fixed bed to the first fixed bed. The first bromide salt in the first fixed bed is regenerated by passing the bromine over the first fixed bed. The bromine reacts with the second bromide salt in the first fixed bed to produce the first bromide salt, which is retained in the ^{first} ~~second~~ fixed bed in a solid state.

In a preferred embodiment, the first and second fixed beds are purged before regenerating the first bromide salt in the first fixed bed and the metal oxide in the second fixed bed by passing an unreactive gas over the first and second fixed beds to remove any hydrocarbons therefrom. The first and second fixed beds are also preferably purged after regenerating the first bromide salt in the first fixed bed and the metal oxide in the second fixed bed by passing an unreactive gas over the first and second fixed beds to remove any oxygen therefrom.

In accordance with one embodiment, the first fixed bed and the second fixed bed are contained within a single reactor vessel. In accordance with an alternate embodiment, the first fixed bed is contained within a first reactor vessel and the second fixed bed is contained within a second reactor vessel.

The process may further comprise cyclically repeating one or more times the steps of passing the alkane over the first fixed bed, passing the alkyl bromide and the hydrobromic acid over the second fixed bed, and regenerating the first bromide salt in the first fixed bed and the metal oxide in the second fixed bed. The steps of passing

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state, wherein said first bromide salt is retained in said second fixed bed;

passing said alkyl bromide over said second fixed bed in the presence of said water to produce an oxygenated product in a gas state and said first bromide salt in a solid state, wherein said first bromide salt is retained in said second fixed bed;

5 purging said first and second fixed beds with an unreactive gas to remove any hydrocarbons from said first and second fixed beds;

regenerating said metal oxide in said second fixed bed by passing oxygen over said second fixed bed, thereby reacting said oxygen with said first bromide salt in said second fixed bed to produce said metal oxide in a solid state and bromine in a gas state, wherein said metal oxide is retained in said second fixed bed;

10 regenerating said first bromide salt in said first fixed bed by passing said bromine over said first fixed bed, thereby reacting said bromine with said second bromide salt in said first fixed bed to produce said first bromide salt, wherein said first bromide salt is retained in said ^{first}~~second~~ fixed bed; and

15 purging said ^{first}~~second~~ fixed beds with an unreactive gas to remove any hydrocarbons from said first and second fixed beds.

32. A process for converting an alkane to an oxygenated product comprising:

20 passing an alkane in a gas state over a first fixed bed containing a first bromide salt in a solid state to produce an alkyl bromide in a gas state, a hydrobromic acid in a gas state and a second bromide salt in a solid state, wherein said first and second bromide salts include a transition metal having a higher valence state and a lower valence state and said transition metal is at said higher valence state in said first bromide salt and at said lower valence state in said second bromide salt;

25 passing said hydrobromic acid over a second fixed bed containing a metal oxide in a solid state to produce water in a gas state and said first bromide salt in a solid state; and

passing said alkyl bromide over said second fixed bed in the presence of said water to produce an oxygenated product in a gas state and said first bromide salt in a solid state.

30 33. A process for regenerating materials used in an alkane to an oxygenated